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Book Review

Micro-Robots, Sensors Shape Urban Warfare

Marine Corps tactical war games focus on enhancing 'situational awareness'

by Roxana Tiron

A recent war game sponsored by the Marine Corps is offering insights into the challenges of fighting urban wars and is helping participants to determine what military technologies will be needed in the future, said officials from the Center for Emerging Threats and Opportunities.

CETO was established last year as a partnership between the Marine Corps and the Potomac Institute for Policy Studies.

As part of its plan to identify emerging threats and find solutions for future military war-fighting challenges, CETO has been running a urban warfare exercise, called Project Lincolnia, since October 2000. The exercises will end this fall and the center will start working on recommendations, which will be submitted to Defense Department officials.

The war-game project had a $700,000 budget.

CETO designed Project Lincolnia to find a methodology that combined strategy, operation and tactics for military operations in urban terrain (MOUT). "All of that was being done under a common scenario," said the director of the project, Gary Anderson, a retired Marine Corps colonel.

Under this methodology, "the ambassador can ask the lieutenant why he blew up a certain building," said Anderson. "You get cross talk that you don't
traditionally see in war games."

traditionally see in operations."

MOUT operations have more than a military dimension, said Anderson. Current urban operations have economic and diplomatic implications and also are used for aid relief.

"One of the main criticisms of Panama [when the United States ousted dictator Manuel Noriega] was that it had been a good military plan, but it did not have a follow-on piece on how to transition the country from Noriega and repair the damage from an economic and diplomatic perspective," said Anderson.

According to CETO, Project Lincolnia is the Defense Department's first attempt to examine military operations in urban terrain at the strategic, operational and tactical levels. In fact, it was initiated as a response to a General Accounting Office report, which said that current Pentagon efforts are too focused on tactical operations and neglect strategic and operational concerns.

The project, for the most part, was built around war game seminars that put together strategic and operational-level simulations. The force-on-force exercises tested decisions and information developed during the strategy and operational games, said Anderson. The first force-on-force exercise took place at the former George Air Force base, in California, at the beginning of this year as part of Lincolnia I, while the second one occurred at the MOUT facility in Quantico, Va., as part of Lincolnia II.

The war game's scenario is set in the mythical nation of Nicolesia. During Lincolnia I, role players negotiated a cease-fire among three factions vying for control of the capital, Lincolnia.

However, the situation in Lincolnia was deteriorating and it became evident, during project Lincolnia II, that a weapons-control process would be needed to reduce civilian casualties, restore the cease-fire and provide security for a humanitarian relief effort in place.

Role players representing the State Department, the intelligence community, a joint task force and the United Nations were tackling this problem. The United States established a military presence on the ground. Troops had to monitor the demilitarized borders between historically hostile factions and also were responsible for heavy weapons detection, inspection and collection. This part of the exercise, additionally, used a network of simulated robotic sensors designed to detect heavy weapons in the city and increase situational awareness.

Most of the simulation in this project was based on the joint conflict and tactical simulation (JCAT). JCAT is the latest model of the joint conflict and joint tactical simulation family, which are both Janus-like models. Janus was the first conflict simulation to use the graphical user interface as the standard for viewing the information.

JCAT is a multi-sided, interactive, entity-

level construction simulation that U.S. government agencies use for training, exercises, analysis and mission planning. JCAT uses real terrain and elevation data and models the world three-dimensionally. This allows for a detailed examination of individual and small-unit performance in realistic rural or urban scenarios.

The CETO exercise integrated two sites into the city of Lincolnia. One was Yoda Ville, the target city with Vietnam-era containers that the Marine Corps built in Yuma Arizona, and the other one was the former George Air Force base. "If you try to simulate live fire, you put it into the computer," said Anderson. "If you want the troops running around, then you put them in another place."

JCAT can simulate almost anything from individual service members, tracked and wheeled vehicles aircraft, surface ships, submarines, environmental factors, complete 3-D buildings, multi-resolution terrain, precision-guided weapons, effects of biological and chemical agent release, human behavior characteristics, casualties, damaged equipment and both anti-tank and anti-personnel minefields.

To test certain equipment, the project organizers selected an incident and put it into the computer on a map of a local area. At first, they ran the war game without any computer-based simulations, to see what exactly happened when the technology was not available, said Anderson. "Then we added the technology to see if friendly casualties would go down. You can do multiple runs and change the variables," he explained.

Anderson said, "One of the biggest challenges you have [in an urban environment] is situational awareness on the ground," because of the abundance of corners, bridges and hidden places. "Generally, UAVs (unmanned aerial vehicles) are useful, but they can't see what is going on underneath structures," said Anderson.

The latest force-on-force exercise that took place at Quantico experimented heavily with ground and airborne sensors. Cameras and sensors were also placed on the MOUT site and were teamed with the micro-robots to simulate the capability of additional eyes. The ground sensors communicated with killer unmanned aerial vehicles, said Anderson, to give the robot operators the ability to call in fire against moving and mobile targets.

Employing small or micro-robots into the exercise is part of CETO's Reconnaissance Surveillance and Target Acquisition (RSTA) Cloud concept. The RSTA concept attempts to overcome the limitations of using western human reconnaissance teams in Third World urban environments—where they stand out among the civil population. A responsive and accurate targeting capability is needed, said Anderson.

That is why CETO has been pushing the testing of micro-robots for ground reconnaissance. "We tried to get small robots on the ground and make them small enough so that they can't be discovered," Anderson said. "They have, at the other end, a human eyeball watching from a safe distance."

"We have been looking at killer UAVs to do things that you would normally not want a manned helicopter to do for live-

fire support," explained Anderson. "We've found that helicopters are

very vulnerable in urban environments. ... We've got some really good results in combining some ground robots with UAVs," he added.

The tactical experiments have provided an opportunity for the technologists to get together with Marines to see what worked and what did not, said Anderson. He explained that people developing the tools would know how they would be employed on the field and what capabilities the Marines needed.

"The Marines are very good to tell you what works and what doesn't work," said Anderson.

Under the RSTA Cloud concept, individual Marines can request reconnaissance assets, said Lt. Col. Wade Johnson, a Marine reservist who worked on the war game. "You normally don't see Marines at the lower levels getting that kind of information," said Johnson. "All these assets go to higher levels usually."

He explained that, traditionally, a lot of the planning will occur at the battalion level, then the company commander would get the information, but the squads and platoons can't see "on the other side of the hill."

"Even with the limited technology [in the exercises], we have found it useful to push data from company level to squads and individual Marines," said Johnson. Marines were able to maneuver more confidently when they knew they could go across the road or that enemies were hiding in the buildings and they should not make a move.

Anderson said that ground sensors and transmitters still need to be miniaturized, so they are less visible. "Our most capable robots right now are too big to be really covert, but the small ones are too small to transmit data," said Anderson. "But I don't think we are ever going to replace manned reconnaissance completely."